

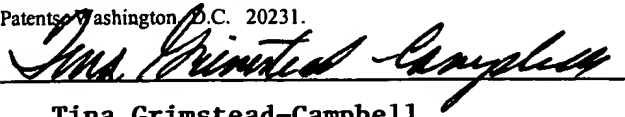
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APPENDIX D

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APPENDIX D

Card Class File Converter byte code conversion process

0-1

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```
#ifdef TRANSLATE_BYTECODE
/* Translate specific opcodes to general ones */
for (pc = 0; pc < codelen; pc = npc) {
/* This is a translation code */
if (codeinfo[code[pc]].valid == 2) {
switch (code[pc]) {
case ILOAD_0:
case ILOAD_1:
case ILOAD_2:
case ILOAD_3:
insertSpace(code, &codelen, pc, 1);
align += 1;
code[pc+1] = code[pc] - ILOAD_0;
code[pc+0] = ILOAD;
break;

case ALOAD_0:
case ALOAD_1:
case ALOAD_2:
case ALOAD_3:
insertSpace(code, &codelen, pc, 1);
align += 1;
code[pc+1] = code[pc] - ALOAD_0;
code[pc+0] = ALOAD;
break;

case ISTORE_0:
case ISTORE_1:
case ISTORE_2:
case ISTORE_3:
insertSpace(code, &codelen, pc, 1);
align += 1;
code[pc+1] = code[pc] - ISTORE_0;
code[pc+0] = ISTORE;
break;

case ASTORE_0:
case ASTORE_1:
case ASTORE_2:
case ASTORE_3:
insertSpace(code, &codelen, pc, 1);
align += 1;
code[pc+1] = code[pc] - ASTORE_0;
code[pc+0] = ASTORE;
break;

case ICONST_M1:
insertSpace(code, &codelen, pc, 2);
align += 2;
code[pc+2] = 255;
code[pc+1] = 255;
code[pc+0] = SIPUSH;
break;

case ICONST_0:
case ICONST_1:
case ICONST_2:
case ICONST_3:
case ICONST_4:
case ICONST_5:
insertSpace(code, &codelen, pc, 2);
align += 2;
code[pc+2] = code[pc] - ICONST_0;
code[pc+1] = 0;
code[pc+0] = SIPUSH;
break;

case LDC1:
insertSpace(code, &codelen, pc, 1);
align += 1;
code[pc+1] = 0;
code[pc+0] = LDC2;
break;
}
}
}
```

case BIPUSH:
 insertSpace(code, &codelen, pc, 1);
 align += 1;
 if ((int8)code[pc+2] >= 0) {
 code[pc+1] = 0;
 }
 else {
 code[pc+1] = 255;
 }
 code[pc+0] = SIPUSH;
 break;

case INT2SHORT:
 removeSpace(code, &codelen, pc, 1);
 align -= 1;
 npc = pc;
 continue;

)
 }
 else if (codeinfo[code[pc]].valid == 4 || codeinfo[code[pc]].valid == 5) {
 /* Switches are aligned to 4 byte boundaries. Since we are inserting and
 * removing bytecodes, this may change the alignment of switch instructions.
 * Therefore, we must readjust the padding in switches to compensate.
 */
 opad = (4 - (((pc+1) - align) % 4)) % 4; /* Current switch padding */
 npad = (4 - ((pc+1) % 4)) % 4; /* New switch padding */
 if (npad > opad) {
 insertSpace(code, &codelen, pc+1, npad - opad);
 align += (npad - opad);
 }
 else if (npad < opad) {
 removeSpace(code, &codelen, pc+1, opad - npad);
 align -= (opad - npad);
 }
 }
)
 npc = nextPC(pc, code);
 }
 #endif

/* Relink constants */
 for (pc = 0; pc < codelen; pc = npc) {
 npc = nextPC(pc, code);
 i = (uint16)((code[pc+1] << 8) + code[pc+2]);

 switch (code[pc]) {
 case LDC2:
 /* 'i' == general index */
 switch (cItem(i).type) {
 case CONSTANT_Integer:
 i = cItem(i).v.tint;
 code[pc] = SIPUSH;
 break;

 case CONSTANT_String:
 i = buildStringIndex(i);
 break;

 default:
 error("Unsupported loading of constant type");
 break;
 }
 break;

 case NEW:
 case INSTANCEOF:
 case CHECKCAST:
 /* 'i' == class index */
 i = buildClassIndex(i);
 break;

 case GETFIELD:
 case PUTFIELD:
 /* 'i' == field index */

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D {
/* i = buildFieldSignatureIndex(i); */
i = buildStaticFieldSignatureIndex(i);
break;

case GETSTATIC:
case PUTSTATIC:
/* 'i' == field index */
i = buildStaticFieldSignatureIndex(i);
break;

case INVOKEVIRTUAL:
case INVOKENONVIRTUAL:
case INVOKESTATIC:
case INVOKEINTERFACE:
/* 'i' == method signature index */
i = buildSignatureIndex(i);
break;
}

/* Insert application constant reference */
code[pc+1] = (i >> 8) & 0xFF;
code[pc+2] = i & 0xFF;
}

E {
#ifdef MODIFY_BYTECODE
/* Translate codes */
for (pc = 0; pc < codelen; pc = npc) {
npc = nextPC(pc, code);
code[pc] = codeinfo[code[pc]].translation;
}
#endif

F {
/* Relink jumps */
for (i = 0; i < jumpPos; i++) {
apc = jumpTable[i].at;
pc = jumpTable[i].from;
npc = jumpTable[i].to - pc;

code[apc+0] = (npc >> 8) & 0xFF;
code[apc+1] = npc & 0xFF;
}

/* Fixup length */
imeth->external->code_length = codelen;
imeth->esize = (SIZEOFMETHOD + codelen + 3) & -4;
}